

The opinion in support of the decision being entered today was not written for publication and is not binding precedent of the Board.

Paper No. 17

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte YOUNG J. LEE and BOK W. CHO

Appeal No. 1998-2951
Application No. 08/675,692

ON BRIEF

Before LALL, GROSS, and BARRY, Administrative Patent Judges.
GROSS, Administrative Patent Judge.

DECISION ON APPEAL

This is a decision on appeal from the examiner's final rejection of claims 28, 29, and 31 through 38, which are all of the claims pending in this application.

Appellants' invention relates to a capacitor structure in which the bottom electrode is formed over a layer of titanium nitride and formed of tungsten having plural recessed and elevated portions. Claim 28 is illustrative of the claimed invention, and it reads as follows:

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28. A semiconductor device comprising:
a substrate having a primary surface;

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a first layer formed on said primary surface of said substrate and comprising TiN; and

a second layer formed on said first layer, said second layer comprising tungsten having a plurality of recessed portions and a plurality of elevated portions adjacent said recessed portions, wherein said second layer covers an entire exposed surface of said first layer.

The prior art references of record relied upon by the examiner in rejecting the appealed claims are:

Gonzalez et al. (Gonzalez)	5,262,662	Nov. 16, 1993
Kashihara et al. (Kashihara)	5,382,817	Jan. 17, 1995
Tanaka et al. (Tanaka)	JP 6-132493	May 13, 1994
(Japanese Kokai Patent Publication)		

Claims 28, 29, and 31 through 38 stand rejected under 35 U.S.C. § 103 as being unpatentable over Gonzalez in view of Tanaka and Kashihara.

Reference is made to the Examiner's Answer (Paper No. 14, mailed November 28, 1997) for the examiner's complete reasoning in support of the rejection, and to appellants' Brief (Paper No. 13, filed November 12, 1997) and Reply Brief (Paper No. 15, filed January 27, 1998) for appellants' arguments thereagainst.

OPINION

We have carefully considered the claims, the applied prior art references, and the respective positions articulated by appellants

and the examiner. As a consequence of our review, we will reverse the obviousness rejection of claims 28, 29, and 31 through 38.

Appellants argue (Brief, page 6) that the combination of Gonzalez and Tanaka fails to suggest all of the claimed limitations. We agree.¹

More specifically, independent claims 28 and 29 recite that the tungsten has recessed and elevated portions. In Tanaka, it is the polysilicon that forms such irregularities. The examiner states (Answer, page 8) that "[t]he mere fact that . . . [Tanaka] discloses texturizing a lower plate electrode of a capacitor cell is sufficient to teach modifying lower plate electrodes of capacitor cells, whether or not they are made from tungsten." We agree with the examiner that the teachings of a reference are not limited to the explicit disclosure but rather extend to the inferences that can be drawn therefrom. We also agree that Tanaka suggests that roughening the top surface of a capacitor's bottom electrode (and not merely

¹ Although the examiner combines Kashiwara with Tanaka and Gonzalez for all of the claims, Kashiwara is applied solely to show particular dielectric materials and adds nothing regarding the limitations lacking from Tanaka and Gonzalez. Therefore, we will limit our discussion to Tanaka and Gonzalez.

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polysilicon) increases the capacitance. However, we disagree that Tanaka suggests roughening the tungsten layer of Gonzalez.

The tungsten of Gonzalez is covered with a layer of polysilicon, thereby making polysilicon the top surface of the bottom electrode. Thus, the skilled artisan would have applied

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the teachings of Tanaka to Gonzalez's polysilicon layer, since polysilicon is the top layer of Gonzalez's bottom electrode as in Tanaka's device and is the same material roughened by Tanaka. There would have been no reason also to roughen the tungsten of Gonzalez. Accordingly, the combination of Gonzalez and Tanaka fails to meet the claim limitation that the tungsten has recessed and elevated portions.

In addition, as pointed out by appellants (Brief, page 6), claims 28 and 29 recite that the second (or tungsten) layer covers an entire exposed surface of the first (or titanium nitride) layer, whereas Gonzalez's tungsten layer covers only a small portion of the exposed surface of the titanium nitride. Hence, the combination of references fails to meet yet another limitation of the claims. Consequently, we cannot affirm the rejection of claims 28 and 29 nor of claims 31 through 38, which depend therefrom.

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CONCLUSION

The decision of the examiner rejecting claims 28, 29, and 31 through 38 under 35 U.S.C. § 103 is reversed.

REVERSED

PARSHOTAM S. LALL)	
Administrative Patent Judge)	
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)	BOARD OF PATENT
ANITA PELLMAN GROSS)	APPEALS
Administrative Patent Judge)	AND
)	INTERFERENCES
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LANCE LEONARD BARRY)	
Administrative Patent Judge)	

APG:clm

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